The CHEMIST

Publication of
THE AMERICAN INSTITUTE OF CHEMISTS, INC.
V. F. KIMBALL, *Editor*, 233 Broadway, New York City
VOLUME XVIII FEBRUARY, 1941 NUMBER 2

THE AMERICAN INSTITUTE OF CHEMISTS
HOWARD S. NEIMAN, *Secretary*
233 Broadway
New York, N. Y.

Entered as second class matter April 8, 1936, at the Post Office at New York, N. Y., under Act of August 24, 1912.
Issued monthly except in June, July and August at 233 Broadway, New York, N. Y.
Subscription price, $2.00 a year. Single copy, this issue 25 cents

CONTRIBUTING EDITORS (Continued)

Ivy M. Parker, 4741 Pease Ave., Houston, Texas.

W. B. Parks, 105 West Potlitzer, Pittsburg, Kansas.

J. M. Purdy, The Lowe Brothers Company, Dayton, Ohio.

Ashley Robey, P. O. Box 96, State College, Arkansas.

Milton O. Schur, Brown Company, Berlin, New Hampshire.

G. C. Scott, Minnesota Valley Canning Company, Le Sueur, Minnesota.

Kenneth A. Shull, 2437 Bryn Mawr Avenue, Ardmore, Pennsylvania.

Alexander J. Stirton, Color and Farm Waste Division, U. S. Department of Agriculture, Washington, D. C.

Margaret C. Swisher, University of Buffalo, Buffalo, New York.

Harold H. Tucker, 4759 N. Woodburn Street, Milwaukee, Wisconsin.

IN THIS ISSUE

Cover Picture:

The Council On Professional Problems

MANY professional problems must be overcome before chemists can make the full benefits of their science available to society and before their abilities can win recognition. These problems can be solved only with an effective internal knowledge of the conditions which exist in the profession.

Chemist Advisory Council was established to determine the facts which control the relationship between the chemist and industry. It is the only organization, sponsored by professional associations, to which chemists can bring their problems for discussion and advice pertaining to their personal welfare. It recognizes that both the welfare of the chemist and of industry can be accomplished only if the chemist is working where his abilities can be utilized most effectively and if his economic security is assured.

If chemists are to be guided intelligently, the splendid work now being done by Chemist Advisory Council to obtain an adequate knowledge of actual conditions must receive all support. If chemists had better knowledge of these factors and of the various changes due to technological or other improvements in the industries, the economic condition of the chemist would be better assured, and his training and abilities would be utilized to better advantage for the improvement of society.

What is the place of the chemist in industry? Often the chemist thinks of himself as a scientist while the industrial employer considers him as an artisan. This is only one of the problems affecting personnel placement. The right man must be selected for the right job. A creative research chemist will be seriously misplaced in a position requiring routine work. To prevent this waste of scientific ability, a program must be established to select suitable personnel for available positions.

Chemist Advisory Council, in addition to a survey of opportunities in the chemical industry, has met the challenge of the individual chemist and endeavors to fit him into the program through the use of his particular training and abilities. The individual chemist often lacks a sufficient knowledge of the general trends in industry to know where he belongs and how his experience can be used. A discussion of his

experience record often reveals where his services are needed. A large proportion of workers in industrial fields have learned to concentrate on routine services, thus a slight fluctuation in industrial processes affects employment. Those not adaptable to a particular process may find themselves out of positions without the information they need about industrial opportunities. To these the Council gives self-reliance and self-help through a study of their records. The Council is doing everything possible to remove the false impression that an unemployed chemist is necessarily an "unemployable."

The excellent work done so far by the Chemist Advisory Council has shown how effective such a program can be in the Metropolitan area of New York, and it has revealed the possibilities of such guidance for chemists all over the country. It has convinced chemists that this is not only a workable program but an essential contribution to the profession of chemistry as a whole. But there is much more to be done. A welfare center for the chemical profession—a central clearing house—must be established. Sixty local committees have already been set up all over the country, headed by important men who are willing to coöperate to prove that chemists themselves are interested in the promotion of their own welfare. These committees will uncover the particular problems incident to chemists and chemical engineers in each locality. Each chemist who registers with a local committee can easily be listed with all of them and with a central clearing office, thus increasing his opportunities. Similarly information obtained in one locality may be made available to all, and pooled for its statistical value. Vital facts regarding the numbers of chemists and their services are still needed. An excellent beginning of a statistical record of this nature was made in a report by the Washington Chapter of THE AMERICAN INSTITUTE OF CHEMISTS which appeared in the January CHEMIST.

Information such as Chemist Advisory Council is collecting will not only be beneficial to chemists and chemical industry, but will also do much to promote national unity and an understanding of the place of the scientist in our national economy.

A full report of the year's activities of the Council will be found on page 54 of this issue of THE CHEMIST. A study of this report will show that such a program for the professional advancement of chemists deserves the support of every chemist.

—V. F. K.

Chemist Advisory Council, Inc. Secretary's Report for the year 1940

Presented at the third annual meeting of the members of Chemist Advisory Council, Inc., January 30, 1941.

Members of Chemist Advisory Council, Inc.

R. L. Baldwin	Charles A. Kraus
R. T. Baldwin	Walter S. Landis
Frederick M. Becket	Robert J. Moore
M. R. Bhagwat	A. Cressy Morrison
Marston T. Bogert	Howard S. Neiman
Frank G. Breyer	William T. Read
William Callan	Walter A. Schmidt
Gustavus J. Esselen	Maximilian Toch
William L. Evans	Harold C. Urey
Ralph R. Foran	Harold F. Wakefield
Webster N. Jones	Edward R. Weidlein
Henry G. Knight	Louis Weisberg

THE Second Annual Meeting of Chemist Advisory Council, Inc. was held on January 31, 1940. Since then to date, the members of the Board of Directors held four formal meetings, and the Executive and Finance Committees held one joint meeting. Six new members were elected. Total membership of the Council now is twenty-four.

Registration

Total registration of qualified chemists and chemical engineers, as of January 1, 1941, was 1823. 56.6 per cent of these registrants resided in the greater New York metropolitan area at the time of registration and 43.4 per cent lived in other sections of the United States. Residents of forty-five states and graduates and post-graduates of practically all important educational institutions are represented. 48.5 per cent met the requirements for Group No. 1, 49.4 per cent for Group No. 2, and 2.1 per cent for Group No. 3.

Group No. 1 (Total 884)

Qualifications:

B.S. degree with two or more years' industrial experience, or
M.A. degree with more than one year's industrial experience, or
Ph.D. degree with or without experience.

Residence:

48.2 per cent resided in the greater New York metropolitan area.
51.8 per cent resided outside New York.
44 states are represented.

Education:

Graduates and post-graduates of 150 colleges and universities.
48.6 per cent have B.S., Ch.E. degrees.
18.5 per cent have Master's degrees.
26.3 per cent have Doctor's degrees.
6.6 per cent have foreign degrees.

Age:

44.7 per cent are below 30 years of age.
37.5 per cent are between 30 - 40 years of age.
13 per cent are between 41 - 50 years of age.
4.8 per cent are above 50 years of age.

Experience:

45 per cent have less than 5 years' industrial experience.
24 per cent have between 5 - 10 years' industrial experience.
20 per cent have between 11 - 20 years' industrial experience.
11 per cent have above 20 years' industrial experience.
There are 63 women in this group, or about 7 per cent.

Group No. 2 (Total 901)

Qualifications:

B.S. degree but less than two years' industrial experience, or
M.A. degree but less than one year's industrial experience.

Residence:

66.6 per cent resided in the greater New York metropolitan area.
33.4 per cent resided outside New York.
40 states are represented.

Education:

Graduates and post-graduates of 171 colleges and universities.
85 per cent have B.S., Ch.E. degrees.
14.5 per cent have Master's degrees.
0.5 per cent have foreign degrees.

Age:

79 per cent are below 25 years of age.
17 per cent are between 25 - 30 years of age.
4 per cent are above 30 years of age.

Experience:

71 per cent have had no industrial experience.
29 per cent have less than two years' experience.
There are 116 women in this group, or about 13 per cent.

Group No. 3 (Total 38)

Qualifications:

Non-graduates having more than five years' industrial experience.
These men have attended one or more institutions of higher education but do not possess chemical degrees.
(This being a small group, the percentage classification did not appear to be very significant.)
446, or 24 per cent of the total registration, reported that they had secured permanent employment.

The above classification is entirely based upon information given by the registrants and the files were not checked to determine their present status. With increased publicity, no doubt the number registering and those securing employment would materially change. However, the following facts deserve consideration. During the past three years, total

registration averaged about six hundred per year. The slight decline during this year was probably due to better employment possibilities created by the defense program. The number of persons qualifying in Group No. 1 was about equal to the number having little or no experience. The same applied to the number registering from the greater New York metropolitan area and those residing outside of the metropolitan area. The percentage classification with respect to education, age, etc. appears to remain constant. This year, the general qualifications of registrants in the upper bracket and also the number of Ph.D's without experience increased. However, younger men with engineering training or experience are finding less difficulty in securing employment. Needless to mention that the above registration does not include a large number of borderline cases, immigrants, and others who called on the Council for assistance. The Council's office received approximately between 3500 and 4000 visits this year.

Registrants are assisted by the Chemist Advisory Council in several ways. Many of them require guidance in the preparation of experience records to show their background to best advantage and to enable employers to evaluate their work. Experience records must be analyzed to determine the field in which the chemist would be most useful. For example, a chemist's record may show that he is best fitted for a position which utilizes the knowledge gained in two or more kinds of work in which he has been employed. Registrants must be shown how to look at employment possibilities from the employer's point of view in order to decide what they have of value to offer to a specific employer.

Trends in employment must be determined and chemists must be taught to analyze the possibilities of work in their field and to broaden their vision of opportunities in other fields in which their experience can be utilized. Some applicants must be shown how to prepare letters which present their abilities favorably. Occasionally a slight change in attitude or the actual method of conducting an interview is all that stands between a registrant and a position.

It is important, too, that where courage and confidence is lacking this must be instilled. Sometimes excellent chemists are highly sensitive introverts who develop a sense of inferiority and doubt of their own ability when they find themselves out of employment. In such cases morale must be kept up, particularly where the experience is of

so unusual a nature that an opening for its use is not quickly found.

The Council offers a place where chemists may come to discuss their problems in confidence, where they may get a clear analysis of their situation from a rational and impersonal point of view without bias of any kind. The Council has given a considerable amount of time to assistance of this nature. A number of applicants have found that an analysis of their possibilities and information about how to present these effectively are all that is needed to enable them to accomplish their objectives.

The following examples were selected to show how the Council functions in assisting registrants:

A PHYSICAL CHEMIST, fifty-five years of age, with long experience and having certain physical handicaps, was put in touch with a research program of a non-commercial nature where he is now connected.

A CHEMICAL ENGINEER, assistant to an executive, forty-five years of age, because of unusual specialty found several temporary connections where a knowledge of statistical and economic studies was desired. He finally found himself employment with a chemical manufacturer.

A YOUNG MAN with experience in fur treating was directed to a company engaged in water conditioning problems.

AN ASSISTANT CHIEF CHEMIST, about fifty years of age, having experience in the detergent field, was put in touch with a textile house.

A WOMAN with experience in spectroscopy found her experience quite useful with a metallurgical concern requiring spectrographic analytical methods. This was a new venture requiring ability to organize a new laboratory.

THE CHIEF CHEMIST of a small concern engaged in the manufacture of nutritional products found a connection with a research laboratory engaged in synthetic organic preparations.

A YOUNG CHEMICAL ENGINEER left his position because of what he considered as "poor working conditions" and found employment as a maintenance man in chemical operations.

A CHEMIST, approximately eighty years of age, with long experience, was put in contact with an organization requiring a person to carry on literature surveys.

A WOMAN with long experience in synthetic organic and biochemical problems was advised to seek employment in the teaching field.

A PLANT MAINTENANCE ENGINEER found very satisfactory employment with an insurance company in their industrial hazards division.

The following examples indicate something of the information and advice which is given by the Council to registrants residing in various sections of the country:

A COLLEGE TEACHER in Tennessee was put in touch with a similar position in Texas.

A Ph.D. located in Indiana with some experience in research was directed to contact an organization in Michigan.

AN ENGINEER with experience in process development, located in Michigan, found a satisfactory contact in Upstate New York.

A RESEARCH CHEMIST with experience in plastics and residing in Ohio sold himself to a concern engaged in the manufacture of artificial thread located in Maryland.

A CHEMIST with experience in micro-photography, spectroscopy, etc. with a rubber concern in Ohio found a satisfactory position in Pennsylvania with a rayon manufacturer.

A TECHNICAL DIRECTOR from Upstate New York, with experience in fats and oils and organic compounds in general, joined a consulting firm located in Illinois.

THE PLANT MANAGER of a plastics concern in Massachusetts found a similar type of position with a coal-tar distiller in Pennsylvania.

A Ph.D. from the University of Pennsylvania was put in touch with the Mellon Institute in Pittsburgh.

A RECENT Ph.D. from Iowa is now employed in Connecticut.

A TECHNICAL DIRECTOR, with experience in starch and sugar, from Illinois, is now employed in Indiana.

A M.I.T. Ph.D. residing in Delaware is now employed in Southern New Jersey.

A FOOD AND BIOCHEMIST from California found a connection with a concern engaged in the manufacture of flavoring extracts and soft drinks.

A CHEMICAL ENGINEER, formerly employed with a large concern in Illinois, was put in touch with the office of the same company in New York City.

All of the above instances were taken from the 1940 registration.

The following few excerpts taken from communications received during 1940 from registrants are self-explanatory:

"I feel that through your efforts in providing me with the introduction and the advice which you gave me at my last visit, I have secured a position which will be more than just a 'job'. I believe that it is the type of position in which one can work towards a place of responsibility and respect."

"I want to thank you very sincerely for your sympathetic attention to my requests for advice and for your suggestions as to how to widen the job-hunting campaign."

"I thank you most sincerely for your advice and suggestions, particularly for your advice regarding the desirability of leaving my former employer on the best possible terms with my late superior."

"It is difficult to express my appreciation for the leads and counsel you gave me while I was looking for a connection. Thank you kindly for your assistance and time spent in my behalf."

"At your suggestion, I talked with Mr. . . . . at the . . . . plant. He was in need of a man in his laboratory dealing with research in analytical methods in organic chemistry. After I passed the physical examination, he offered me a position which I accepted."

"I don't believe that I can really tell you how happy I am after two days of work. . . . . Thanks are quite inadequate for all of your efforts and guidance which I appreciate to the utmost."

". . . . I want to tell you how deeply grateful I am for your kind assistance and advice without which I would not have obtained this position. Thank you again."

At present Chemist Advisory Council is serving the profession by performing these functions:

(1) A restorer of morale by kindly interest and wise advice from fellow chemists.

(2) A coördinating organization for all local efforts on behalf of chemists.

(3) A clinic in which the basic causes of unemployment are uncovered and studied and possible remedies are found.

The general program of the Council embraces these activities:

(1) Working through local committees who are familiar with their own situations.

(2) Discussing in open forums all phases of problems of employment.

(3) Exchanging information freely among local committees through the office of the Council.

(4) Securing adequate information about unemployed chemists and chemical engineers by maintaining a registration file with duplicates of these records for the use of the Council and the local committees concerned.

(5) Making every possible effort to bring records of professionally qualified unemployed registrants to the attention of industry, and information about potential jobs to the attention of registrants.

(6) Giving advice and counsel by well-qualified members of the profession.

(7) Providing adequate publicity in scientific, technical and trade periodicals.

(8) Giving financial aid in cases of dire need.

All services of the Council are given free of charge.

Proposed Expansion of the Council

The encouraging results thus far accomplished by the Council in assisting the unemployed led to the idea of expanding the activities by establishing local coöperating committees in all industrial sections in the country. This program was proposed by President Read and approved by the members of the Board, and members of Chemist Advisory Council. At the present time, fifty-seven important men have accepted the Council's invitation to serve as local chairmen of coöperating committees in their respective areas. Practically all important states are represented in this group. Communications from these sectional chairmen are very encouraging and illuminating. All are convinced of the

usefulness of the program which is aimed towards improving the status of the chemical profession and giving every assistance to the unemployed. In due course of time, these chairmen will select the members of their voluntary committees. Leaflets and other informative material regarding the work accomplished by the Council will be available to them for distribution among all chemists and chemical engineers in their respective sections. Eventually, everyone in the profession will be informed of our activities on their behalf, and they will also be requested to give their financial support towards maintaining this worthy project.

Financial Status

This year, the Council did not make a general appeal to chemists and chemical engineers for funds. Most of the money was raised by the efforts of the individual members of the Council, the Committee of the North Jersey Section, and others who were aware of our work. THE AMERICAN INSTITUTE OF CHEMISTS and the N. Y. Paint and Varnish Production Club have generously contributed.

During 1940, 443 contributors gave $2,775.00.

A comparative classification of contributions, expenditures, etc. are as follows:

	1938		1939		1940	
	No.	Amount	No.	Amount	No.	Amount
Companies	10	$ 630.00	10	$1,095.00	11	597.00
Laboratory Groups (1) representing	23	143.00	(10) repr. 321	981.52	(14) repr. 373	722.00
Individuals	127	2,724.00	131	3,906.50	58	1,256.00
Societies and Associations	4	565.00	1	150.00	1	200.00
	164	$4,062.00	463	$6.133.02	443	$2,775.00

Expenditures for 1938	$3,660.63
Expenditures for 1939	4,756.72
Expenditures for 1940	5,095.18
Balance, January 1, 1939	$1,364.59
Balance, January 1, 1940	2,775.89
Balance, January 1, 1941	455.71

Other Forms of Assistance Received

The Council continued to occupy its office at 300 Madison Avenue until the end of May, 1940, through the generosity of the Carbide & Carbon Chemical Corporation. Due to lack of space there, we were obliged to rent our present office in the Lincoln Building, 60 East 42nd Street, which is very conveniently located. However, this has increased our burden of expenditures by about $700.00 per year.

The Congoleum-Nairn Company very generously donated floor covering which has decidedly increased the appearance of the office and provides a cheerful atmosphere to visitors.

The Council received the following technical and other publications with the compliments of the respective publishers: *Chemical Industries, Chemical & Metallurgical Engineering*, the *Oil, Paint and Drug Reporter*, the *News Edition* of the American Chemical Society, THE CHEMIST, *The Indicator, The Michigan Architect and Engineer*, the *Textile Chemist and Colorist*, the *Chemical Engineering Catalog*, and *The New Yorker*. The *News Bulletin* of the National Farm Chemurgic Council, periodical reports of the Federal Emergency Relief Administration, and announcements of United States Civil Service Examinations were also received. Weekly information announcements regarding positions available, as published in the Sunday issues of the *New York Herald Tribune*, were also forwarded with the compliments of the *Tribune*.

The Treasurer and other members of the Board donated all clerical services required for the Council incidental to their respective offices.

Publicity

The technical press announced the election of officers, etc. soon after the Second Annual Meeting last January.

The President's office forwarded a considerable amount of personal correspondence to a large number of important men in industrial and educational fields bringing the work of the Council to their attention and requesting their assistance in expanding these activities in all parts of the country.

Your Secretary attended practically all meetings of sponsoring societies held in the greater New York metropolitan area, and meetings of the National Council of THE AMERICAN INSTITUTE OF CHEMISTS. During these meetings, he was able to discuss the work of the Council with individual chemists and chemical engineers.

Recommendations

The present procedure of registering and assisting the unemployed should be continued.

Plans should be adopted to secure wide publicity so that every chemist and chemical engineer in the country will be informed of the work of the Council and its importance to all in the profession and the industry.

The sponsoring societies should be urged to discuss the objectives and services of the Council at their local or national meetings. They should also urge their members to support the work of the Council by forwarding small contributions.

The procedure now adopted by the North Jersey Section Committee in collecting group contributions from chemists and chemical engineers in their section should receive sufficient publicity so that members of other chemical laboratories will follow their example.

The success of the Dollar-A-Year Subscription Plan for raising sufficient funds for the expenditures of the Council will no doubt depend upon time and publicity. While this program is being put into operation, the Council should proceed to secure adequate funds by contacting companies, associations, or individuals. An ideal arrangement would be to have the expenditures of the Council underwritten for the next five years by the groups mentioned above so that the continuance of the Council will be assured. With the added expenditures due to rent and the proposed expansion program, the Council will require about $10,000 during 1941.

Conclusion

In conclusion, I wish to extend to the members of the Council and the Board my deepest appreciation for giving me this opportunity to present to you the progress made by the Council during the past three years. I am thoroughly convinced of the Council's usefulness to both individual members of the profession and the industry.

Respectfully submitted,
M. R. Bhagwat, *Secretary.*

At the annual meeting of Chemist Advisory Council, Inc., held on January 30, 1941, the following officers and members of the board of directors were re-elected to serve during 1941: President, William T. Read; Vice-President, Gustavus J. Esselen; Secretary, M. R. Bhagwat; Treasurer, Robert T. Baldwin. Board of Directors: Robert T. Baldwin, Frederick M. Becket, Marston T. Bogert, Frank G. Breyer, Gustavus J. Esselen, Walter S. Landis, William T. Read, Maximilian Toch, and Edward R. Weidlein.

Teacher and Pupil

By **Ed. F. Degering, F.A.I.C., and Rosemary Ince,**
Purdue University, Lafayette, Indiana.

I. THE NEF LINE OF CHEMISTS

Picture by Courtesy of Librarian, University of Chicago.

F. John Ulric Nef

JOHN Ulric Nef, brilliant student of Adolf von Baeyer, was born in Herisan, Appenzell Canton, Switzerland, June 14, 1862. He was the eldest son of Johann Ulric Nef and Anna Catherine (Mock) Nef. His father was the superintendent of a textile factory. As a boy Nef possessed a very sensitive perception.

In 1864 his father left Switzerland for the United States to become superintendent of a textile mill at Housatonic, Massachusetts. Four years later the rest of the family left Switzerland to join the elder Nef, taking up residence on a farm near Housatonic, four miles from Great Barrington. Here John attended a district school, walking to and from Great Barrington daily. His father encouraged him to play strenuously, to work hard, to read good books, and to play the organ.

Following his hard work in the winter, he would exercise equally hard in the summer at mountain-climbing or other outdoor sport.

After completing his work at the district school, Nef attended a preparatory school in New York for one year. As the funds in the family were low, he worked diligently on their farm each summer. In 1880, he entered Harvard with the intention of studying medicine. Becoming so fascinated by the study of chemistry, however, he took up chemistry as his life work. His general performance as a freshman at Harvard was not much above the average. The subject that was most difficult for him was German, the language of his homeland and the language he used in most of his later publications.

From the very first, he was the leader of his class in chemistry. During the years at Cambridge, he made many friends among the students and faculty members. By the end of his senior year he led his class in all subjects. He received his A.B. degree from Harvard in 1884.

Because of his brilliant record at Harvard, Nef was awarded a three-year Kirkland Traveling Fellowship. This fellowship obtained for him the desire of his life—to go to Munich and study under the personal direction of Adolf von Baeyer. While there he absorbed much of the German culture and acquired a deep appreciation for German civilization.

At Munich also, Nef demonstrated his remarkable intellect and astonished his professors by his performances. Willstätter himself is authority for the statement that Baeyer once told him that of all the students he had had in his long career at Munich, "Nef was the most brilliant."[1] He received his Ph.D., *summa cum laude*, in 1887. His doctor's thesis, entitled "Ueber Benzochinoncarbonsauren," treated of the compounds related to succinosuccinicethyl ester.

After his return to the United States in 1887, he became professor of chemistry and director of the chemical laboratory at Purdue University during the following two years. In 1889 he left Purdue to become assistant professor of chemistry at Clark University, Massachusetts. Following the resignation of Professor Michael, John Nef was made acting director of the chemical laboratory, in which capacity he served until 1892. He then accepted the invitation of Professor Harper to organize and head the department of chemistry at the University of Chicago. Here he worked untiringly until his death on August 13, 1915, at Carmel-by-the-Sea, California, of a heart attack while traveling with his son.

While at Chicago University, Nef met Louise Bates Comstock, daughter of Orville Comstock of Rochester, New York. She was at one time one of his students, and on May 17, 1898, she became his wife. She died on March 20, 1909, leaving her husband and one son, John Ulric Nef, Jr.

Nef had a profound grasp of his subject, which is essential to a good teacher. He presented his material in a logical manner and was able both to awaken and hold the interest of his students by his enthusiastic and obviously whole-hearted devotion to chemistry. He was a successful teacher in the laboratory, where he taught mainly by example, as well as in the classroom.

Nef was an ideal research worker, for he made himself master of the facts and he worked with the most scrupulous attention to technique. He showed the utmost intensity and persistence in his work. "He had an all-consuming and contagious love for his science. The rapidity of his thought so outdistanced the speed of his words that his students could take only sketchy notes which they would later piece out and amplify in order to get the full value of his lectures. His restless enthusiasm for the problems in which he was engrossed developed in him an appearance of brusqueness which amounted almost to impatience when the research did not progress smoothly. Back of this intellectual eagerness, however, dwelt kindly human qualities."[2] Through the achievements in chemical science of many of his former pupils, Nef's brilliant work as a teacher of research is reflected.

To relax his intense temperament, John Nef took frequent long walks at an uncompanionable speed. Because of his great love of music, he weekly attended during the season the concerts of the Chicago Symphony Orchestra.

"His contribution to science was the development of a new system of organic chemistry based on dissociation concepts by which he demonstrated that carbon does not always function as a tetravalent atom but occurs as a bivalent atom in certain compounds such as the isocyanides and fulminates."[3] His call to Clark University was brought about by his signal research at Purdue University on the structure of quinone. This work forms a very important part of the chemistry of dyes and is accepted the world over.

His publications, due mainly to his research in organic chemistry, total thirty-seven independent articles published in various American and German scientific journals, including Liebig's *Annalen der Chemie* and the *Proceedings* of the American Chemical Society of 1917. The

majority of his publications were written in German. After his death two of his students, Hedenburg and Glattfeld, assembled and published in the *Journal of the American Chemical Society*, August, 1917, the remaining unpublished results of his researches. In the *American Chemical Journal* and in the *Journal of the American Chemical Society* there appeared during the years of his active work numerous articles prepared in collaboration with his students. Numerous theses for doctor of philosophy degrees were written under his direction. Nef never collected his theories into a single volume, nor did he write a textbook.

Dr. Nef was a member of the American Academy of Arts and Sciences, the National Academy of Sciences, the American Chemical Society, the American Association for the Advancement of Science, and the Royal Society of Sciences of Upsala, Sweden. The University of Pittsburgh conferred the honorary degree of LL.D. upon him in 1915.

"The researches of Nef offer unusually interesting material for the study of the influence of scientific ancestry, or, if you please, the stability of the intellectual germ plasm, as well as of the development of original ideas. The geneology runs as follows: Gay-Lussac begat Liebig, Liebig begat Kekulé, Kekulé begat Baeyer, Baeyer begat Nef," and Nef begat twenty-five Ph.D. students who have carried on. "There is no doubt that of these, the influence of the father, Baeyer, is most clearly evident in Nef's work; but there is evidence that Kekulé's inclinations concerning the architecture of organic molecules, Liebig's biological attitude, and even some of the features of Gay-Lussac are discernible."[4]

Nef's high esteem and admiration for his teacher, Baeyer, is shown in his earlier works. In later years though he still followed the modes of experimentation of Baeyer, he struck out on paths differing from those of his teacher. There is much similarity between Nef and Baeyer in the great stress laid on careful manipulation and technique of experimentation, in the reading of chemical literature, in the retainment of great stores of chemical information, in complete devotion of time and energy to research and teaching, and in the methods of approaching a problem, as well as in the apparatus used.

"It is, I feel, no exaggeration to say that Nef was one of the most single-minded and conscientious investigators we have had in modern science. He lived entirely for the science he loved; his whole life was devoted to its ends."[4] Nef truly was a man and a teacher of a very rare and altogether admirable type.

Bibliography

1. John Ulric Nef, **The Man and Teacher**, by J. W. E. Glattfeld, Chicago University Record, Vol. 16-17, 1930-31, pp. 110-114, University of Chicago Press.
2. **Dictionary of American Biography**, Vol. XIII, 1934, pages 403-404, Charles Scribner's Sons.
3. **The National Cyclopedia of American Biography**, Vol. XXI, 1931, page 368, James T. White and Company.
4. John Ulric Nef, **The Investigator**, by Herman A. Spoehr, Chicago University Record, Vol. 16-17, 1930-1931, pp. 173-179, University of Chicago Press.

Carleton Ellis

It is with deep regret that THE AMERICAN INSTITUTE OF CHEMISTS records the death of Carleton Ellis, on January 13, 1941, in Miami, Florida. Influenza was given as the immediate cause of death.

Mr. Ellis was born on September 20, 1876, in Keene, New Hampshire. In 1900, he was graduated from the Massachusetts Institute of Technology and for the following two years, he served as an instructor in chemistry at that institution. He assisted in founding the Ellis-Chalmers Company. In 1908, he established the Ellis Laboratories, Incorporated, at Montclair, New Jersey. Mr. Ellis specialized in research in organic chemistry, although perhaps he is best known for his work in the fields of petroleum, paints, varnishes and coatings, and in synthetic resins. He invented the "tube and tank process" used in petroleum refining, and patented the urea formaldehyde type of resin. He also held basic patents on the production of isopropyl alcohol, acetone, and other substances from petroleum.

In November of this year, Mr. Ellis was credited with his seven hundred and fifty-third United States Patent, and several hundred more patent applications are still pending in the United States Patent Office. While a student at Massachusetts Institute of Technology, Mr. Ellis patented a paint and varnish remover commercially in use today. He was the author of many technical articles and books, including *Hydrogenation of Oils, Synthetic Resins and Their Plastics, The Chemistry of Petroleum Derivatives*, and *The Soilless Growth of Plants*.

Mr. Ellis was a member of a number of associations, including The American Institute of Chemical Engineers, The Chemical Association of London, and The Chemists' Club, New York. He was the first president of the New Jersey Chemical Society in 1919, which later became the North Jersey Section of the American Chemical Society.

He became a charter member of THE AMERICAN INSTITUTE OF CHEMISTS in 1923.

The Young Chemist and the Government Service

By **Louis Marshall, F.A.I.C.**

The eighteenth of a series of articles on the opportunities for chemists in the Government Service.

ONE of the most important of the independent agencies of the Government, the Tennessee Valley Authority, provides opportunities for chemists in the fields of fertilizer and chemical engineering research. These investigations are undertaken by the Authority in obedience to its congressional mandate to aid in developing the natural resources of the Tennessee River drainage basin and adjoining territory. The primary and most difficult task in the carrying out of this mandate is the improvement of navigation and prevention of floods by the construction of dams at strategic points on the river. These structures provide, incidentally, a gigantic source of electric power which is sold to the inhabitants of the Tennessee Valley at very low rates. The policy encourages the increased use of electricity, thus lessening the burdens of labor on the farm and in the home, and encouraging the establishment of industrial plants. All of these related functions, improvement of navigation, prevention of floods, production of electrical power which can be sold cheaply, and investigations into the problems involved in the manufacture of fertilizers, principally phosphates, combine to make the Tennessee Valley Authority the embodiment of a great social vision; the experiment in collective effort "par excellence", whose success will be of incalculable benefit to this as well as to succeeding generations of Americans. It may be observed, too, that this work can be readily and most usefully integrated into the national defense effort.

The researches on fertilizers are conducted at the great plant at Muscle Shoals, which was built during the days of the World War for the production of war materials. In carrying out this part of its program, the Authority decided to concentrate its energies on the production of phosphate plant foods, since it is the opinion of a school

of agricultural thought that the farmlands of the United States are being gradually and seriously depleted of this essential fertilizer. No crop can be grown successfully on a soil which does not contain phosphorus in a form in which it can be assimilated by the plant and neither plant nor animal life can continue with full vitality in the face of a deficiency of this fundamentally important nutrient. Plants, for example, will not grow a strong root system, nor will they be capable of holding the soil, if they suffer from a deficiency of phosphorus. Cattle likewise fall easy victims of disease and for the same reason. Furthermore, any program leading to the large-scale production of cheap and efficient phosphate fertilizer will go a long way toward breaking the vicious agricultural circle of increasing cost of cultivation, decreasing returns, and eroding land.

What is this phosphorus problem which is causing such grave concern alike to experts who have studied American agriculture and know its shortcomings and to statesmen who work toward a secure nation resting upon the sturdy foundation of prosperous farmlands? The problem is the gradual disappearance of the essential element from the agricultural soils of the country. What is its cause? Civilization. The ancient maxim, "Dust thou art, to dust returneth," applies when considering the world as a whole, but it does not apply to any particular farming region. The products of the soil are shipped in immense quantities to cities where they are consumed. The phosphorus which they contain does not return to the soil to nuture it further. It does go to build up the bodies of those who dwell in cities, for about sixteen per cent of dry bone consists of phosphorus. A great deal goes to waste down sewers, and a significant portion is, like the good which men do, "oft interred with their bones," in cemeteries.

The phosphate mines of the United States form the world's most important source of the mineral. At present, about three million tons of phosphate rock, about one-third of the total supply of all countries, are mined in the United States, principally in the regions of Florida and Tennessee. It is known, however, that vast deposits exist in the states of Utah, Wyoming, Montana, and Idaho, but the cost of mining and transporting fertilizer from these sources of supply is entirely too great. The outstanding problem, therefore, to the solution of which the Tennessee Valley Authority has dedicated itself, is this: The development of methods for producing concentrated fertilizer, which contains a minimum of inert ingredients, which can be transported cheaply,

and can be made available to farmers everywhere at prices they can afford to pay.

The phosphate rock which forms the starting point in the manufacture of fertilizer is insoluble and therefore unavailable to growing plants. The basic task in the production of a suitable plant food is to transform this insoluble natural phosphate into a soluble form which can be utilized.

The commercial fertilizers which for many years were sold to the farmer to meet the phosphate requirements of his soil, were products containing only twenty per cent of available plant food, the remainder consisting of inert ingredients. Under the circumstances, the research men of T.V.A. decided that the production of higher-strength fertilizer would be of the greatest value to agriculture. After a great deal of preliminary work, the conditions necessary for attaining this end were established.

The phosphate rock together with coke and silica are smelted in an electric furnace at a temperature of about 2750° F. The coke acts as a reducing agent and liberates phosphorus from the rock, while the silica reacts with the calcium constituent of the rock to form residual calcium silicate. The liberated phosphorus is burned to phosphorus pentoxide which is made to react with water producing phosphoric acid having a strength of about eighty per cent. This high-strength acid is mixed with phosphate rock to produce the triple super-phosphate which is the product ready for use on the land. The plant food content of the material is about forty-three per cent, or more than double that of the ordinary commercial variety.

The T.V.A. plant at Muscle Shoals has already produced many thousands of tons of this material. A great deal of it was used for demonstration purposes not only on experimental tracts of land, but also on privately owned farms, and the improvements in the way of increased yield of farm products and decreased erosion of land wrought by the liberal use of the fertilizer have been so striking that farmers everywhere have come to realize that the development of this plant food marks a great forward step in the economy of farm management.

A further advantage of phosphatic fertilizer is that its use in the growing of legumes like alfalfa or lespedeza enables these plants to bring down from the air nitrogen, which is fixed in the form of nitrates. The farmer is thus spared the necessity of purchasing nitrate fertilizers. It has been noted, moreover, that cattle show a decided preference for phosphated pasture lands as against untreated pastures.

Chemical engineering research has brought the T.V.A. process to a high degree of efficiency. The yield of the fertilizer material is satisfactory and the by-products of the chemical reactions have been put to use. Carbon monoxide, for example, serves as a fuel for drying the crude phosphate ore which comes from the mine as a yellow mud. Likewise, it has been found possible to utilize the calcium silicate slag for the manufacture of concrete.

Recently, the laboratories of the T.V.A. announced the development of a process for making a fertilizer containing about seventy per cent of available plant food. In this method, carbon monoxide and phosphorus in the gaseous state are burned together, and the hot gases are caused to pass into a tower containing lumps of rock phosphate. The burned phosphorus combines directly with the rock making calcium metaphosphate or "metaphos". The latter runs out at the bottom of the tower where it hardens into an amber-colored cake which can be ground to proper size. The material is dissolved by the soil solutions and then taken up by the plant roots.

Since the cost of transportation of fertilizers forms a major element in its price, it is obvious that one which contains a large proportion of available plant food and a minimum of inert ingredients will prove to be the most economical. Its low cost encourages the farmer to use more of the material with consequent improvement in the quality and quantity of his crops.

The use of the electric furnace process for the production of fertilizer, as developed by T.V.A., may make it possible to mine the low-grade phosphate ores which exist in immense quantities in Idaho and adjoining states. Heretofore it has been found possible to use only the better grades which occur mainly in Florida and Tennessee. It is the opinion of experts that a plant food of sufficiently high concentration to make commercially practicable its shipment to other parts of the country can be manufactured from the low-grade ores. The future may, therefore, witness the establishment of a large new fertilizer industry in the region where these ores exist.

The important advances which, in the few years of its existence, the research staff of T.V.A. has made in the field of fertilizer production, when contrasted with the long previous period during which low-strength phosphatic fertilizer was practically the only type on the market, are a good illustration of the necessity for research conducted by scientists under Government auspices.

The work at the Muscle Shoals plant has demonstrated that elementary phosphorus can be made in large quantities from its ores. The phosphorus, which of itself is not a plant food, can be utilized, however, in the production of concentrated fertilizer. If necessary, its use can be diverted to the manufacture of incendiaries of war; or it can be employed for the production of smoke screens, for phosphorus when burned has the highest total obscuring power of any substance known.

The publications reporting the experimental work of the T.V.A. technical staff have appeared in the *Journal of Industrial and Engineering Chemistry*, and the *Chemical and Metallurgical Engineering Journal*. Scattered throughout these two periodicals, since the year 1935, are numerous articles dealing with the fertilizer work of T.V.A. In addition, some patents have been issued covering the inventions of its employees.

In the vast program of the Tennessee Valley Authority, the function of investigating the fertilizer needs of the nation has been publicized the least. It is possible, however, that history will judge that part of its work to be of the greatest and most lasting importance.

The Grades of Chemist

Of the ten major departments of our government, only three, the Department of Labor, the Post Office Department, and the Department of State, do not employ chemists. When any of these three Departments require the services of chemists, they call upon outside Government laboratories. For example, the National Bureau of Standards does the testing work for the Post Office Department to determine the compliance with specification requirements of the commodities which it purchases. The chemical laboratories of the other seven Departments, those of Agriculture, Commerce, Interior, Justice, Navy, Treasury, and War which have been described in the preceding pages, employ practically all the chemists working in the civil service.

There are, however, a few other institutions which utilize chemists. For example, Saint Elizabeth's Hospital and Freedmen's Hospital, both Government institutions, have laboratories in which the chemical examinations incident to hospital work are carried out. The same is true of the United States Soldiers' Home in Washington. The Civil Service Commission itself employs two chemists to make up the competitive examinations in chemistry, and to rate the answer papers submitted by the candidates.

The various grades of chemists which have been mentioned, from junior chemist to head chemist, are all based, theoretically at least, upon certain well defined differences in the duties and responsibilities of the work, and on the minimum qualifications for eligibility thereto. These differences, as well as certain practical considerations in the matter of applying for a position in chemistry in the Government service, will be discussed.

The official specifications for the position of Junior Chemist state that he may be called upon "to assist chemists of higher grade by performing routine steps in chemical research requiring fundamental technical training, but not involving the necessity for mature judgment, the responsibility for interpretation of data, or the authority to make recommendations on the basis thereof." He may be called upon to perform a great variety of chemical analyses, most of which are in accordance with standard laboratory methods. As illustrations of substances on which junior chemists make varied determinations can be cited, ores, petroleum, petroleum products, natural gas, mine gases and dusts, explosives, alloys, soils, rubber goods, ceramic materials, textiles, rosin, turpentine, cement, solid fuels, paints, insecticides, narcotics, foodstuffs, etc. A junior chemist is expected to make determinations of such physical chemical constants as melting point, boiling point, solubility, specific gravity, osmotic pressure, vapor pressure, etc. The particular type of work done is, of course, dependent upon the work of the laboratory to which he was appointed. For instance, one laboratory may be engaged almost entirely in insecticide work, another in analyses of alloys; a third in petroleum products; a fourth in foodstuffs, and so on. In most of the Government laboratories the work is varied and interesting; in others, the work is more or less routine and monotonous. There are great differences among these laboratories. Some of them are devoted entirely to research, some entirely to analytical work, and others, like the laboratories of the Food and Drug Administration, find it necessary to combine research and analysis in carrying out their duties. The working conditions and the prospects of advancement and graduate study vary considerably with the different Government Departments, and indeed these factors may vary with the different laboratories within the same Department. These circumstances, plus the well-known difficulty in obtaining a transfer in the civil service, lead to the observation that the first appointment which the junior chemist receives is likely to have an important influence

upon his career. He is, however, at liberty to take another examination either for the same or for a higher grade while holding a position with the Government, and depending upon his standing on the eligible list, he may receive a different appointment resulting from the later examination.

The qualifications for the position stipulate graduation from a college or university of recognized standing with major work in chemistry. In the past, applications were also accepted from students in their senior year. They were permitted to take the examination and to receive provisional appointments, but they were not permitted to enter upon duty until they had received their college degrees. In the 1936 Junior Chemist examination, however, applications from senior students were not accepted and whether or not this represents a permanent departure from the previous custom, remains to be seen. A candidate for a Junior Chemist position must not have reached his thirty-fifth birthday on the date of the close of receipt of applications. (This age limit does not apply to persons who are granted preference because of military or naval service.) He must be in sound physical health, since failure to pass a physical examination given by a Federal medical officer will prevent appointment.

The criteria defining the different grades of chemists are based primarily upon the differences in the duties and responsibilities of the work, and on the experience requirements. Thus, while the junior chemist is supposed to work, "under immediate supervision and with little opportunity for independent or unreviewed action or decision," the assistant chemist works, "under general supervision, with limited latitude for independent or unreviewed action or decision." The functions of the next grade, that of Associate Chemist, are "to work under general supervision, but with considerable latitude for independent or unreviewed action or decision". A chemist in the associate grade performs, either individually or with trained assistants, responsible scientific work in some field of chemistry. Thus there is a regular graduation in the duties and responsibilities of the work, until, in the case of head chemist, the requirements read, "under administrative direction, with the widest latitude for independent or unreviewed action or decision, to be in charge of a laboratory or field station engaged upon professional or scientific work of unusual importance and difficulty in which research and other problems of unusual complexity are constantly encountered; to plan and initiate major scientific projects; to pass upon the work of subordinates; as an executive to direct

the business activities of the establishment and to establish its working policies; and to perform related work as assigned." The above quotations are taken from the official Government publication entitled, "Preliminary Class Specifications of Positions in the Field Service."

While no experience requirement is attached to the junior chemist position, a candidate for the position of assistant chemist must have at least two years of acceptable postgraduate study or two years of successful experience in doing work of the grade and character required of a junior chemist. The minimum qualifications which a candidate for the position of Associate Chemist must possess are either three years of postgraduate study in chemistry which must have fulfilled the requirements for the degree of Ph.D or D.Sc., or three years of professional experience which must have involved the successful development of one or more scientific projects, and the preparation of full reports of work accomplished. He must have proven his capacity for independent professional work in chemistry. The requirements for the position of Chemist are similar to those of Associate Chemist, with the additional qualifications that the candidate must have demonstrated important professional and scientific attainments. He must have a broad knowledge of chemistry and its supporting sciences, and the ability to develop working plans, and to supervise and coördinate investigational or production work. The senior chemist must have shown marked capacity for original research, and must have proven his qualities for technical or administrative leadership. For the position of Principal Chemist, a candidate must have outstanding professional attainments, marked ability to recognize the possibilities for fruitful research investigations along new lines, and in general he must have shown an outstanding capacity for original research, and the application of research to scientific problems. A Head Chemist must have demonstrated his preëminent scientific attainments. He must have a comprehensive knowledge of chemistry, its supporting sciences, and its literature, and a thorough familiarity with the activities of scientific and professional organizations and institutions engaged in research in chemistry. He must be capable of furnishing, for executive action, expert advice on chemical subjects, and, he must have demonstrated scientific or administrative leadership of a high order. A study of these different grades reveals, therefore, a definite correlation between the duties and responsibilities of a position, and the minimum qualifications demanded for eligibility thereto.

Service with the Government carries with it certain decided advantages. Employment is undoubtedly more steady than in outside industry generally. When a chemist receives his first appointment, he serves a probationary period usually of six months duration. After he has satisfactorily completed this period, he receives permanent appointment and cannot thereafter be discharged except for very weighty reasons. The hours of work are regular, and this makes it possible to undertake certain outside activities as, for example, post-graduate study. Chemists usually work thirty-nine hours per week.

The facilities of many Government laboratories are unexcelled and the physical working conditions are usually very good. As to the human working conditions, they are what humans make them.

A great deal depends upon the person who happens to be the supervisor, the chemist-in-charge. If he is the type who is equipped, by virtue of his character, ability, and attainments, to lead others, it is a genuine pleasure and inspiration to serve under his guidance. Work in such a case, even arduous and difficult duty, often seems like play. If, however, the supervisor lacks the essential qualities of leadership, if he is selfish or jealous of the progress made by his subordinates, the conditions of service often become very unpleasant, and the ordinary tasks become ever so much harder to perform. Most supervisors in the Government service belong undoubtedly to the first category. There are some, however, who do not meet the requirements of leadership, and it is indeed unfortunate that this latter type should attain to positions involving direct supervision over the work of others. In an organization so vast as the United States Civil Service, one might expect to find occasionally persons who have been misplaced, but in the interest of the employee and the public it is the necessary duty of sound personnel administration to eliminate or reduce to a minimum such costly errors.

All employees of the executive departments of the Government enjoy the same leave privileges; twenty-six working days per year. Ample vacation periods are thus assured to all.

In case of sickness, an employee may be absent for as long as fifteen days in one year, and receive his full salary during his disability. There are regular provisions for retirement. Deductions amounting to 3½ per cent are made from each person's salary and applied toward his retirement annuity. In view of these decided advantages, it is not difficult to see why many chemists seek to make their careers

in Government service. On the other hand, it must be said that, contrary to the general impression, there are no mandatory annual increases in salary. There are very many cases of able chemists who have worked for years without receiving any increase in pay. It is possible, however, that future legislation will correct this condition.

When an examination for the position of chemist, in any grade, is announced, an application form may be obtained from the United States Civil Service Commission, Washington, D. C. It is a rather lengthy form, and it should be filled out with the greatest care. All questions must be answered truthfully. It is well for a person to keep a duplicate record of the completed application form for his own information. The announcement of an examination states the date after which no applications will be received, and each person should make sure that his application is mailed in time to reach the Commission on or before that date.

For every grade beyond that of junior chemist, the examination is an "unassembled" one. That is, competitors are not required to take a written examination, but are rated on their education, experience, publications, etc., on a scale of one hundred, such ratings being based upon competitors' sworn statements in their applications and upon corroborative evidence.

However, in the last two announcements of examinations for assistant chemist which occurred in 1938 and 1940, candidates were required to report for a written test. The latter had a relative weight of fifty per cent, the other half being based upon the type of experience and other qualifications presented by the applicant.

For the Junior Chemist position, however, a written examination is required, and it has a relative weight of one hundred per cent. Each candidate must take the test in general chemistry and elementary physics. In addition, he must take the test in one, or, if he chooses, two of the following optional subjects: Organic, advanced inorganic, physical, analytical, or biological chemistry. In deciding whether to take the examination in one or two of the optional subjects, it should be borne in mind that a very high rating in the examination in general chemistry and elementary physics and one of the optionals is infinitely preferable to a merely passing grade in two of the optional subjects. The reason is that the best appointments, those offering the finest opportunities, are given to the men at the top of the list. They are the appointments worth getting and worth striving for. Indeed, under present competitive conditions, it takes a high rating to get any appointment at all.

Another factor to be considered, is that separate lists of eligibles are made up from the examinations in each of the optional subjects, and it is probably true that more appointments are made from the eligible list in analytical chemistry, than from any of the others. However, this should not deter a person from taking the examination in one of the other optional subjects in which he would like to specialize.

In recent years, promotions in the Civil Service have been very slow. There are junior chemists who, under ordinary circumstances, could easily qualify for assistant chemist or even associate chemist or chemist. As to the higher grades, although there no statistics to fortify the assertion, it is safe to say that of those chemists who enter the Government service, themselves selected men, fewer than one per cent rise to the rank of head chemist. Thus do the stern eliminative processes of life in the course of time gradually assert themselves. "Many are called but few are chosen". However, when appointments to higher grades are made, the usual policy is to make them by promotion and not by the selection of chemists outside the Civil Service.

ANNUAL MEETING

of THE AMERICAN INSTITUTE OF CHEMISTS

The eighteenth annual meeting of the Institute will be held on May 17, 1941, at the Wardman Park Hotel, Washington, D. C.

The Committee on charge of annual meeting arrangements consists of Dr. Robert J. Moore, Dr. Maximilian Toch, and Mr. Howard S. Neiman, together with the Washington Chapter of the Institute which will act as host.

The medal of the Institute will be awarded to an outstanding chemist at this meeting, and every member is urged to make plans now to attend this important event. Full details will appear in the next issue of THE CHEMIST.

COUNCIL

OFFICERS

President, Harry L. Fisher
Vice-president, W. T. Read
Secretary, Howard S. Neiman
Treasurer, Walter J. Murphy

COUNCILORS

E. R. Allen
Donald H. Andrews
Frank D. Breyer
Gustav Egloff
Charles N. Frey
Joseph W. E. Harrisson
Henry G. Knight
Robert J. Moore
Norman A. Shepard
Foster D. Snell
Maximilian Toch

CHAPTER REPRESENTATIVES

New York	*Niagara*	*Philadelphia*	*Washington*
Marston L. Hamlin	A. W. Burwell	Gilbert E. Seil	Albin H. Warth

January Meeting

The one hundred and seventy-sixth meeting of the National Council of The American Institute of Chemists was held on January 22, 1941, at The Chemists' Club, 52 East 41st Street, New York, N. Y., at 6:30 o'clock P. M.

President Harry L. Fisher presided. The following officers and councilors were present: Messrs: E. R. Allen, Frank G. Breyer, H. L. Fisher, C. N. Frey, M. L. Hamlin, J. W. E. Harrisson, H. G. Knight, H. S. Neiman, W. T. Read, G. E. Seil, and M. Toch. Dr. W. D. Turner, Mr. M. R. Bhagwat, and Miss V. F. Kimball were present.

The minutes of the preceding council meeting were approved.

The Treasurer's report, covering the period from December 17th to January 22nd, showing total cash in banks and on hand of $4,108.83 with no bills payable, was read and accepted.

Dr. W. T. Read, Chairman of the Committee on Membership, reported progress in the organization of local membership committees.

Upon motion made and seconded it was decided to hold the annual meeting of The American Institute of Chemists in Washington, D. C., on May 17, 1941.

The date for the next meeting of the National Council was set for February nineteenth.

The Secretary read a letter from the Washington Chapter regarding the Student Medal Awards for 1941, and upon motion made and seconded, the Washington Chapter was authorized to carry out its medal award program for this year.

The Secretary read a letter from the Secretary of the Washington Chapter requesting a change of ruling with regard to those members of the Washington Chapter who have been transferred to sections of the country in which there are no INSTITUTE Chapters. Upon motion made and seconded the Washington Chapter was authorized to keep on its membership rolls those of its members who are so transferred.

The Secretary read a letter from the Washington Chapter, and upon motion made and seconded, the President appointed a committee consisting of Mr. Frank G. Breyer, chairman; Dr. M. Toch, and Dr. W. T. Read, to consider the matter of chapter rebates. The Committee was requested to report at the next meeting of the National Council.

The Committee on Ethics, Dr. W. D. Turner, chairman, reported that no action should be taken on the matter of the file referred to that committee. Upon motion made and seconded this report was accepted.

Frank G. Breyer reported progress for the Chemist Advisory Council. Upon motion made and seconded, THE AMERICAN INSTITUTE OF CHEMISTS agreed to loan the Chemist Advisory Council $200 on a short term basis, for a period of one month.

Dr. Harry L. Fisher reported for the committee to consider the wage and hour ruling and, after suggested changes and discussion, it was moved and seconded that the Committee be given full power to make necessary modifications and to send the proposed suggested changes in the Wage and Hour Law to the Administrator of the Wage and Hour Division of the U. S. Department of Labor.

The following new members were elected:

FELLOW:

Pettit, William Schuyler
(1941), *Instructor in Chemistry*, Ursinus College, Collegeville, Pennsylvania.

Vlacos, Pericles G.
(1941), *Consulting Chemist*, W. S. Purdy Co., Inc., New York City, N. Y.

ASSOCIATE:

Rainer, William C.
(A.1941), *Analytical and Research Chemist*, Crown Cork & Seal Company, Inc., Baltimore, Maryland.

Waters, William Gabriel
(A.1941), *Chemist*, Reed & Carnrick, Jersey City, New Jersey.

JUNIOR:

Segal, Nathan
(J.1941), *Chief Chemist and General Manager*, Landers-Segal Color Company, Brooklyn, New York.

The following changes in rank were made:

ASSOCIATE to FELLOW:

Conklin, Albert E.
Hultquist, Martin E.
MacMullen, Clinton W.
Schenker, Herbert S.
Stone, Irwin

JUNIOR to FELLOW:

Noble, Wesley M.

JUNIOR to ASSOCIATE:

Kennedy, James J., Jr.
Shull, Kenneth

STUDENT TO ASSOCIATE:

McBride, Edward T.

Upon motion made and seconded the president was requested to appoint a committee for the Annual Meeting arrangements and program.

Dr. M. L. Hamlin suggested the program for a statistical study of chemists, and upon motion made and seconded, the President was requested to appoint a committee of three members to consider this subject. The Secretary was requested to send a copy of Dr. Hamlin's suggestions to each member of the Committee, when it is appointed.

There being no further business, adjournment was taken.

CHAPTERS

New York

Chairman, William Howlett Gardner *Vice-chairman,* W. D. Turner

Secretary-treasurer, D. H. Jackson

17 John Street

New York, N. Y.

Council Representative, Marston L. Hamlin

"Chemistry in our Federal Preparedness Program" was the subject of a most interesting talk given by Colonel Marston T. Bogert, F.A.I.C., before the New York Chapter on January 17, 1941, at The Chemists' Club, New York, N. Y.

Colonel Bogert discussed the place of chemists and chemistry in the numerous bureaus, services, commissions, departments, and administrations appointed to take charge of our national defense, but he requested that his talk be not published at the present time because of the continuous changes and new appointments being made in the Federal Preparedness Program which would necessarily cause inaccuracies in any prepared schedule.

Mr. Richard S. Morse, president of the National Research Corporation, spoke on "Vacuum Technology Opens New Fields for Chemists" at the meeting of the New York Chapter on February 21, 1941. His talk will be reported in the next issue of THE CHEMIST.

The speaker for the April meeting to be held April 4, 1941, will be Dr. A. W. Ralston, Armour and Company, on "New Chemicals From Fats."

Niagara

Chairman, J. Allan Camelford *Vice-chairman*, Alvin F. Shepard
Secretary-treasurer, Wilbert A. Herrett
109 Norwood Avenue
Hamburg, N. Y.
Council Representative, Arthur W. Burwell
Carl H. Rasch, *Alternate*
News Reporter to THE CHEMIST, Margaret C. Swisher

Pennsylvania

Chairman, Addison C. Angus *Vice-chairman*, Edward L. Haenisch
Secretary-treasurer, Harold A. Heiligman
1203 West Oak Street
Norristown, Penna.
Council Representative, Gilbert E. Seil
News Reporter to THE CHEMIST, Kenneth A. Shull

Washington

President, Albin H. Warth
Vice-president, L. F. Rader, Jr. *Treasurer*, L. R. Heiss
Secretary, Martin Leatherman
9 Quincy Avenue, Hyattsville, Md.
News Reporter to THE CHEMIST, T. H. Tremearne
Council Representative, Albin H. Warth

Advisory Committee

F. O. Lundstrom, *Chairman*
J. Bernard Edmonds
J. H. Hibben
L. N. Markwood
J. W. McBurney
A. R. Merz
W. H. Ross
J. F. Williams

Promoted

The Monsanto Chemical Company, St. Louis, Missouri, announces the promotion of Dr. Richard Hitchens from group leader in the organic chemical division research department to assistant research director. Dr. Hitchens succeeds Dr. R. Jenkins who was recently appointed to director of research of the Phenol Division.

Applications for Membership

Final action will be taken by the National Council, at its meeting in April, on the following applications:

For Fellow:

Beichert, Walter J.

Chemist, Lindsay Laboratories, Brooklyn, N. Y.

Cowman, James

Chief Chemist, Phosphate Laboratories, Wiley & Co., Inc., Baltimore, Maryland.

Erickson, Julius L. E.

Associate Professor of Chemistry, Louisiana State University, University, Louisiana.

Gebert, Emery Betz

Powder Metallurgist, American Electro Metal Corp., New York, N. Y.

Kuhl, Henry Walter

Chief Chemist, R. H. Macy & Co., Jamaica, N. Y.

Robertson, John William

Research Chemist, International Tailoring Co., New York, N. Y.

Speh, Carl Frank

Chief Chemist, Naval Stores Res. Div., Bureau of Agr., Chem. & Eng., U. S. Dept. of Agriculture, Washington, D. C.

Wallace, John B.

Chemist in Charge Nitrogen Lab., Wiley & Co., Inc., Baltimore, Md.

Weaver, Elbert Cook

Instructor in Chemistry, Bulkeley High School, Hartford, Conn.

For Associate:

Kern, Charles J.

Research Chemist, R. H. Macy & Co., Jamaica, New York.

Moyers, John Bradfield

Research Chemist, Shell Oil Co., Houston, Texas.

Pfann, Harry F.

Chemist, American Cyanamid Co., Stamford, Conn.

For Junior:

Hickey, Frank D.

Fellow in Chemistry, Agricultural Expt. Station, University of Nevada, Reno, Nevada.

For Student:

Arnaco, Matthew Henry

Control Chemist, R. H. Macy & Co., Jamaica, New York.

To be Raised from Associate to Fellow:

Ashen, Philip

Chief Chemist, Alco Manufacturing Co., Brooklyn, N. Y.

To be Re-instated as Fellow:

Sager, DeWitt Dunn

Chief, Chemical Research, Picatinny Arsenal, Dover, N. J.

NORTHERN LIGHTS

***By* Howard W. Post, F.A.I.C.**

Dr. Paul Gagnon, director, École Superieure de Chimie, Laval University, Quebec, P. Q., has presented his New Year's greetings to the Canadian Chemical Association in the form of an editorial in the latest number (December 1940) of *Canadian Chemistry and Process Industries*. Dr. Gagnon writes as president of the Canadian Chemical Association. His words, viewed in the light of developments in our own country are equally applicable to us.

"More Canadians than ever before are saying that the future of our country depends chiefly on the degree of unity it can achieve, and that this, in truth, can come about only through closer and more active coöperation between our ethnically diverse and geographically widespread elements." (Does Canada possess any more "ethnically diverse" or "geographically widespread elements" than we?). "Nothing can do more to this end than the bringing together of men who already possess a basis for mutual understanding in the form of common professional interests. As president of the Canadian Chemical Association, with its network of twenty widely-scattered but closely-linked branches all over Canada, I cannot help but feel that our members are in a very favourable position to achieve within our own field, and diffuse throughout our sphere of social influence the aims which are common to all men of goodwill." (What about our opportunities?) . . . . . "L'année qui commence, comme celle qui vient de s'écouler, sera certainement, pour les chemistes canadiens, une ère de grands progrès . . . . ."

THE SCIENCE ANGLER

Kenneth E. Shull, A.A.I.C.

A series of interesting experiments has revealed that the amount of vitamin A in the blood of dogs is increased after they have consumed an alcoholic highball. Such a reaction has also been found to take place in the 100,000 or so alcoholics who inhabit, or inhibit, the human race—whether or not they lead a dog's life.

It is believed that this increase in vitamin A content of the blood is due to a migration of vitamin A molecules from the liver and other organs to the circulatory system.

Many years ago a simple Dutch lens-maker, Leeuwenhoek by name, gazed for the first time upon a new world—a world teeming with microscopic life. Little did he realize then that numbered among these miniature "giants" were some so powerful and so ruthless that they could destroy an entire army with a single breath.

Today, thanks to the discovery of efficient germicides, those diseases which are caused by bacteria are rapidly being brought under control.

The ancients apparently knew a good deal about the oligodynamic action of metals and of ultra violet radiations in the purification of their drinking water. Of course they didn't know them by any such high falutin' names.

Delvers in "the good earth" have brought to light an old Sanskrit manuscript, dated about 2000 B.C., which proclaims this bit of sound advice: "It is good to keep water in copper vessels, to expose it to sunlight, and to filter it through charcoal".

Nearly everyone, from the pot bellied beer guzzler to the modern old fashioned housewife who continues to dabble in dough, has a warm spot in his heart, and stomach, for yeast. And rightly so, for this unicellular organism has held its head high in society since time immemorial. Even our old friend, Hippocrates, advised its use in the treatment of certain diseases.

Pressed yeast is usually made from yeast cells which have been grown on grain flour extracts. A more recent process, developed in Canada, utilizes the waste sulfite liquor from the paper manufacturing industry as the "culture media". This liquor, after proper treatment, contains 2.75 per cent reducing sugars, of which 60 per cent is fermentable—enough "sweets" to properly propagate prodigious quantities of yeast.

A compound recently marketed under the nom de plume of "Moldol" is said to be the most powerful phenol disinfectant yet developed. In a 0.1 per cent solution it is three times as effective as bichloride of mercury, is non toxic, and only slightly irritating. Thus far it has found application in the make up of glues, inks, pastes, and in other materials of this nature.

BOOKS

TEXTBOOK OF PHYSICAL CHEMISTRY. By Samuel Glasstone. *D. Van Nostrand and Company*. 1940. 1289 pp. $10.00.

Mr. Glasstone has set out to write a new kind of textbook of physical chemistry. He wants to take the student who has a very elementary knowledge of physical chemistry "such as might be gained from a course in general chemistry" and expose him to a large number of topics. He wants to do this sufficiently thoroughly that the student may go on to appreciate the advanced works and the journal literature.

The historical development of subjects and the description of experimental methods are both featured, "in order to foster the research outlook which should form the basis of all science teaching". The historical approach is often used very effectively to show how long some of the so-called "modern" ideas have existed. The author is against the practice of grafting new concepts onto old concepts; he has written his book from an entirely modern point of view, using quite extensively the statistical-mechanical approach. This is seen especially in his treatment of solutions.

The following is a list of subjects covered, with the number of pages devoted to each: Atomic Structure and Atomic Spectra, 115 pages; Radioactivity and Isotopes, 59 pages; First and Second Laws of Thermodynamics, 63

pages; The Gaseous State, 94 pages; The Solid State, 87 pages; Changes of State, 52 pages; The Liquid State, 43 pages; Physical Properties and Molecular Structure, 99 pages; Dilute Solutions, 68 pages; Phase Equilibria, 112 pages; Chemical Equilibrium, 65 pages; Electrochemistry, 154 pages; Chemical Kinetics, 148 pages; Surface Phenomena, 87 pages; Index, 31 pages.

Mr. Glasstone keeps deduction constantly before his reader, but he loses the effect of rigor by asking the reader to accept many statements on faith. He might also leave out some of the exceptions to the rule, for the student might well be confused by these before he gets the fundamentals firmly established. There exist some small mistakes to be expected in a work of this size, and there are a few others not so small, such as the so-called "derivation" from the first law that the energy is a single-valued function of the state (page 179).

Although one-third of the book is in fine print, comprising advanced material not necessarily covered in a first reading, the large print on the 1289 pages covers a very intensive course. At the ends of chapters there are lists of standard works and references to important journal articles. After the student has finished his course work, he will have a reasonably compact reference book of physical chemistry, as well as a guide to further study.

—John Berg.

The Sixth Edition of the *Directory of the Association of Consulting Chemists and Chemical Engineers, Inc.* has just been published. Section one contains a list of the consultants and directors of analytical and testing laboratories who are members of this association, and shows the services they are prepared to render and their qualifications. A geographical classification of the members is given and a subject index offers a quick means of selecting those members who are specially or generally qualified upon any definite subject. The *Directory* is designed to assist organizations or individuals to find qualified chemists and chemical engineers to handle their special problems. It may be obtained without charge upon application to the offices of the Association, 50 East 41st Street, New York, N. Y.

English-Spanish Comprehensive Technical Dictionary. By Lewis L. Sell. *The International Dictionary Company.* 1940. Approximately 30 sets of 48 pages each (10½" x 7¾"). Price $1.00 per set.

The present rapid development of commerce between the United States and the South American countries has caused a need for a greater knowledge of Spanish technical terms than are found in the usual English-Spanish dictionaries.

To fill this need, the English-Spanish Comprehensive Technical Dictionary, containing approximately 360,000 technical words, has been prepared, to be issued in sets of 48 pages each, with approximately 12,000 English and Spanish technical expressions per set.

The technical subjects covered include the aircraft, automobile, radio, television, petroleum and steel products industries; anti-aircraft, aerial photographic mapping, agricultural implements, sporting and commercial terms, mechanics and machine tools, steam, automotive and Diesel engines, boilers, paints and dyes; also office equipment and sugar mill machinery.

The first two sets of this excellent

work have been published and cover the letter "A" and one page of "B". Each set is punched for insertion in a binder, which is supplied on order for sixty-five cents.

The author spent ten years in research and correspondence to prepare this dictionary, which contains a great many expressions not now listed in any other English-Spanish lexicon. The technical material is up-to-date, carefully edited, and cross-referenced. Synonyms and often antonyms are given. The difference between British and American linguistic usage is carefully listed to avoid serious error on the part of the translator using this dictionary; and, similarly, the difference in usage of Spanish terms is indicated for each South American country.

Translators and others who have technical correspondence with South America will find that this dictionary will save them much time and research.

THE DOMESTIC PRODUCTION OF ESSENTIAL OILS FROM PLANTS. Bulletin of the *National Farm Chemurgic Council*, 1940, 77 pp. Price fifty cents.

The National Farm Chemurgic Council, whose purpose is to assist agriculture in this country by finding industrial outlets for chemically transformed agricultural products, has issued this bulletin to encourage the establishment of the domestic cultivation of aromatic plants and thus to develop a new essential oil industry. The United States is spending great amounts of money to import aromatic seeds, roots and essential oils.

This is an industry which is favored by soil and climatic conditions. No elaborate equipment is required, as standard agricultural implements are applicable to the cultivation of aromatic plants. The acre yield gives a higher profit than other crops. The cost of production is cheaper in comparison with the price received for the seeds and roots and the present marketability of the oil.

The authors of this publication, Herman F. Willkie and Paul J. Kolachov, have been successful in growing aromatic plants experimentally, and they feel that if farmers would attempt to grow these plants they would be greatly recompensed.

The table of contents includes, Raw Materials for Essential Oils, The Rôle of Agricultural Engineer in the Production of Essential Oils, The Preferential Odour Rating of Essential Oils from Coriander Seeds, Laboratory Assayment of Raw Materials for Essential Oils, and a Bibliography. The plants recommended for cultivation, and complete information about them, are coriander, caraway, anise, fennel, angelica, and licorice. This bulletin is recommended to anyone interested in the possibilities of domestic essential oil production.

HANDBOOK OF CHEMISTRY AND PHYSICS, 24th Edition, *The Chemical Rubber Publishing Company*. 1940. $3.50.

The fact that this handbook has reached twenty-four editions, and continues to grow, is greater evidence of its usefulness than the testimony of any reviewer. A lowering in price of the present edition is also in its favor.

The revision between this edition and its predecessor includes a change of the form of the organic compound table from paragraphs back to a tabular arrangement. The present reviewer, in commenting on the preceding edition,

was in favor of this change. It is claimed that some three hundred new compounds have been added to the list. However, the list is very considerably padded by giving a serial number to a compound each time that it appears under another name. It is probable that if this were eliminated, the list would be fifteen to twenty per cent shorter, without in the least impairing its usefulness.

Other changes include a new table of the physical constants of industrial organic compounds, a revision of the table of commercial plastics, and a new table of induced radioactivities.

As a whole, it is questionable whether there is any source from which one can get more information for his money. But this is not an unmixed blessing.

The book has become too thick (2¾ in.) as compared with its other dimensions (5 x 7¼ in.) for convenient handling. It seems to the reviewer that a more convenient volume would result if the first three hundred odd pages, containing mathematical tables, and most of the last five hundred pages were bound together in a separate volume, while the material which is more directly related to chemistry was contained in a single volume.

In spite of these minor defects, the volume is indispensable to every working chemist.

—KARL M. HERSTEIN, F.A.I.C.

CHEMISTS

The thirty-fifth impression of the Perkin Medal, awarded annually by the American Section of the Society of Chemical Industry for valuable work in applied chemistry, was presented to Dr. J. V. N. Dorr, President of The Dorr Company, Inc., at a meeting at The Chemists' Club, 52 East 41st Street, New York City, on January 10, 1941. This was a joint meeting with the American Chemical Society, American Institute of Chemical Engineers, The Electrochemical Society and Société de Chimie Industrielle. Dr. Lincoln T. Work, F.A.I.C., presided.

The program was as follows:

The Personal Side of the Medallist—Mr. G. H. Dorr.

The Accomplishments of the Medallist—Dr. Milton C. Whitaker, F.A.I.C.

Presentation of Perkin Medal—Dr. Marston T. Bogert, F.A.I.C.

"The Engineer and His Responsibilities in the World of Today and Tomorrow"—Dr. J. V. N. Dorr.

Dr. E. J. Teeter of the Lilly Research Laboratories spoke on, "The Anemias, Liver Extracts and Iron", before a meeting of the New York Branch of the American Pharmaceutical Association on February tenth at Columbia University, New York, New York. Motion pictures and slides were used to illustrate the talk.

A meeting of the American Section of the Society of Chemical Industry, jointly with the American Institute of Chemical Engineers, was held on February twenty-eighth at the Chemists' Club, New York, N. Y. The meeting was a symposium on wetting agents. Dr. Lincoln T. Work, F.A.I.C., presided.

The topics discussed were:

"The Theory of Wetting Agents", Professor F. E. Bartell, Professor of Chemistry, University of Michigan.

"The Structure of Wetting Agent

Molecules", Mr. C. R. Caryl of the American Cyanamid Company.

"Uses of Wetting Agents", Dr. Samuel Lenher, F.A.I.C., Technical Manager of the Fine Chemicals Division, E. I. du Pont de Nemours & Company.

H. Bennett, F.A.I.C., director of research and development of the Glyco Products Co., Inc., left on December twentieth for a business trip to South America. While there, he will confer with representatives of the Company.

EMPLOYMENT

Chemists Available

INSTRUCTOR in qualitative and inorganic chemistry. Two years' experience. Ch.E. degree. Wishes position in undergraduate school. Please reply to Box 123, THE CHEMIST.

CHEMIST, J.A.I.C., M.S. degree 1932. University of Michigan. Specialized in analysis. Several years of experience in various industries, notably steel. Desires work where precise knowledge is required. Also interested in teaching college chemistry. Location anywhere. Please reply to Box 125, THE CHEMIST.

CHEMIST, J.A.I.C. B.S. 1940. Six months' experience during summers in rubber factory. Fluent French and German. Interested in position as laboratory assistant or translator. Please reply to Box 55, THE CHEMIST.

COMMERCIAL CHEMIST, F.A.I.C., Cornell. Twenty years' experience supervision and administration details. Coal tar, nitrogen soils and fertilizer, plastics, development works, formulating materials specifications. Please reply to Box 23, THE CHEMIST.

COLLEGE TEACHER. American, Ph.D., F.A.I.C., Sigma Xi. Inorganic analytical, organic and industrial chemistry. Several years' university teaching, six years' experience in the chemical industry in heavy chemicals, analytical methods, control, supervision. Publications. Location anywhere. Please reply to Box 25, THE CHEMIST.

COMMERCIAL DEVELOPMENT. Chemical engineer with twenty years of experience supervising research and development in petroleum refining seeks change. Please reply to Box 121, THE CHEMIST.

CHEMIST, F.A.I.C., experienced in chemical and pharmaceutical products, foods, specialties, etc. Able to handle analytical research, production and supervision. Miscellaneous pharmaceutical compounding, medicinal and chemical preparations a specialty. Writer is known for technical publications in the United States and abroad. Out of position on account of abandonment of plant with which he had been affiliated for ten years. Please reply to Box 11, THE CHEMIST.

CHEMICAL ENGINEER, F.A.I.C. Age 35. Varied experience with Bureau of Standards, Du Pont and others qualifies me for semi-works development, process trouble shooting, cost reduction work in many fields. Mechanically minded; analytical viewpoint. Please reply to Box 21, THE CHEMIST.

CHEMIST, B.S., M.S. Age 41, wishes to promote new chemical product or add capital to growing concern requiring services of capable executive with successful business record. Prefer Philadelphia, New York, or vicinity. Please reply to Box 17, THE CHEMIST.

Positions Available

CHEMIST on paint formulation Eastern Seaboard.

YOUNG CHEMICAL ENGINEERS, graduates for pilot plant operation, eastern Pennsylvania.

PH.D.'s. Recent graduates in organic, physical, or chemical engineering.

RECENT CHEMISTS AND CHEMICAL ENGINEERS particularly from Mid-West Schools, for variety of plant and control operations, locate East.

CHEMIST with considerable experience in organic research and development for supervisory capacity, must be experienced in this line.

For these positions, please refer to Box 20, THE CHEMIST.

PH.D.—WOMAN. Organic and physical chemistry, excellent reading knowledge French and German for writing, abstracting assistance. Please reply to Box 22, THE CHEMIST.

United States Civil Service Examinations:

No. 30 unassembled

Principal Technologist (any specialized branch) ..... $5,600 a year
Senior Technologist (any specialized branch) ..... $4,600 a year
Technologist (any specialized branch) $3,800 a year
Associate Technologist (any specialized branch) ..... $3,200 a year
Assistant Technologist (any specialized branch) ..... $2,600 a year

United States Civil Service Commission announces open competitive examinations for the positions named above in such specialized branches as explosives, fuels, plastics, rubber, minerals, textiles, or any other well-defined specialized branch.

Applications will be rated as received until December 31, 1941, and certification made as the needs of the service require.

No. 42 unassembled

Principal Chemical Engineer (any specialized branch) ..... $5,600 a year
Senior Chemical Engineer (any specialized branch) ..... $4,600 a year
Chemical Engineer (any specialized branch) ..... $3,800 a year
Associate Chemical Engineer (any specialized branch) ..... $3,200 a year
Assistant Chemical Engineer (any specialized branch) ..... $2,600 a year

The United States Civil Service Commission particularly desires applications from persons with the following types of experience: For the Department of the Interior, Bureau of Mines: Strategic mineral research. Experience with the unit process of chemical engineering useful in the extraction of manganese, tin, chromium, nickel, antimony, mercury, or tungsten.

For the Department of Agriculture, Regional Research Laboratories: Industrial utilization of surplus agricultural products—experience in the chemical engineering phases of this work and in the economics of chemical industry. Applications will be rated as received until further notice.

Application forms for all of the above United States Civil Service Examinations may be obtained from the Secretary, Board of United States Civil Service Examiners, at any first or second class post office or United States Civil Service District Offices, and from the United States Civil Service Commission, Washington, D. C. The exact title of the examination desired should be stated.